DOCUMENT RESUME

ED 200 010 FL 012 084

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TITLE The Ontogenesis of Hypothetical Reference.
INSTITUTION Stanford Univ., Calif. Dept. of Linguistics.
PUB DATE Aug 78
NOTE 15p.; In its Papers and Reports on Child Language Development, Number 15, p88-100, Aug 1978. Not available in paper copy because of small type in original document.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Child Language; Discourse Analysis; *Language Acquisition; Language Research; Longitudinal Studies; Psycholinguistics; Young Children
IDENTIFIERS *Conditionals; *Referents (Linguistics)

ABSTRACT

The spontaneous speech of 14 children aged 2;6 to 5;6 was recorded. One additional child provided longitudinal information from age 2;4 to 5;6. In a second study, 75 children were tested for mastery of hypothetical reference in a story-telling situation. The speech samples from Study 1 and the children's answers from Study 2 were analyzed for eight types of hypothetical reference. The results demonstrate that there is a developmental shift during the preschool years from implicit to explicit hypothetical reference. Initially, children tend to refer to isolated hypothetical events rather than to sequences of events. When reference to sequences does begin, attempts lack internal consistency with respect to hypotheticality. Reference to future hypothetical events appears to be an earlier acquisition than reference to past events. Other-initiated hypothetical references occurred much more often than self-initiated references, but the latter were consistently more accurate than the former. A speculative account for the development of these patterns is offered. (JB)

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THE ONTOGENESIS OF HYPOTHETICAL REFERENCE

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The concern of the present paper is with the development of the child's cognitive/linguistic ability to engage in hypothetical reference, a subtype of the child's developing ability to refer to non-present objects and occurrences. Previous research suggests that the ability to produce and comprehend hypothetical reference is a relatively late acquisition. Young preschool children have been found to lack the ability to decenter temporally (Cromer, 1968, 1971; Piaget, 1969), an inability which precludes hypothetical reference since the child must be able to decenter temporally in order to take account of varying relationships in time from different points of view (cf. Bates, 1976). Cromer (1968, 1971) found that the ability to decenter temporally began to emerge at approximately four-and-one-half- years of age, and so one might expect hypothetical reference to emerge only after this age. (However, Kuczaj, 1977, and Slobin, 1966, found aspects of hypothetical reference to emerge in children younger than four-and-one-half years.)

Consonant with the research on children's temporal decentration, the conditional appears to be a late acquisition (Bates, 1976; Cromer, 1968; Slobin, 1966, 1971; cf. Paris, 1975). This late appearance is thought to reflect semantic rather than syntactic difficulties, as is the late acquisition of the auxiliary have (Cromer, 1968). In other words, it is not the syntactic characteristics of the conditional or auxiliary have which make them late acquisitions, but rather the initial absence of the cognitive abilities which allow one to comprehend the meanings expressed by the linguistic forms (cf. Cromer, 1974; Slobin, 1973). It should be noted that the "late" acquisition of the conditional (and auxiliary have) is relative to the rapid acquisition of other linguistic forms. Slobin (1966) reported that children learning Russian as a first language begin to use the conditional towards the end of their third year. Cromer (1968) found that two English-speaking children began to use hypothetical reference at four-and-one-half years of age, while Kuczaj (1977) found evidence of hypothetical reference (including conditionals) in the speech of some, but not all, two and three-year-olds.

Stanford University Dept. of Linguistics
Papers and Reports on Child Language Development, Number 15

Although there is some evidence that preschool children can engage in hypothetical reference, their skills in this regard are probably quite limited. Piaget has suggested that the thinking of pre-adolescent children is intrapropositional, i.e., confined to a sing.e proposition. According to Piaget, it is not until the formal operational period that interpropositional thinking becomes available (cf. Flavell, 1977). Thus one might expect children who have not yet achieved formal operational thought to engage in hypothetical reference to isolated events and children who have attained formal operational thought to engage in reference to multiple hypothetical events and the relations between these events. However, several investigators have reported evidence which implies that the thinking of the non-formal operational child is not necessarily intrapropositional but instead interpropositional, at least in certain contexts (Amidon 1976; Donaldson, 1963; Hill, 1961; Meyer, 1977). Children who have not yet attained the formal operational level, appear to be capable of interpropositional thought at least insofar as interpreting conditional sentences in terms of logical consequence is concerned, though there is disagreement as to the age at which this ability becomes evident. (O'Brien & Shapiro, 1968; Roberge & Paulus (1971).

To sum up, the present paper is concerned with the following matters: (1) The global problem of the development of hypothetical reference skills. (2) Whether pre-school children are capable of reference to related hypothetical events or just isolated hypothetical events.

The data of concern come from both a longitudinal/cross-sectional naturalistic study and a quasi-experimental study. The naturalistic and quasi-experimental study will be presented in unison rather than successively since the results of the two studies are compatible and we feel that simultaneous presentation will eliminate unncecessary repetition. The method of each study will be presented, followed by a presentation of the results, and finally by a discussion of the results.

Method

Study 1

Subjects. Fifteen children formed the sample of this study. Fourteen of the children (five females, nine males) formed a cross-sectional sample, covering the age range from 2;6 (years; months) to 5;6, such that two children were observed at each 6-month interval. The remaining child (Abe, the oldest son of the first investigator) provided longitudinal information, participating in the study from 2;4 to 5;6.

Procedure. Approximately one hour of Abe's spontaneous speech in his home environment was recorded each week (two 0.5-hour sessions per week) from 2;4 to 4;1, with 0.5 hour of spontaneous speech being recorded each week from 4;1 to 5;1. From 5;1 to 5;6, the investigation became more of a diary-type study than a systematic sampling investigation. One hour of spontaneous speech per week for six consecutive weeks was obtained for each child in the cross-sectional sample.

Study 2

Subjects. 75 children (40 females, 35 males) ranging in age from 3;0 to 7;9 participated in Study 2. This sample consisted of 15 3-year-olds, 15 4-year-olds, 15 5-year-olds, 15 6-year-olds, and 15 7-year-olds.

Procedure. Each child was tested individually. The child was initially asked to tell the experimenter a story about a lion. During this phase, the experimenter avoided using hypothetical terms, instead using prompts such as "What happened next?" and "and then what happened?" to encourage the child to continue with his story. Following this, the experimenter read one of a set of three very short stories to the child, and then immediately asked the child factual, future hypothetical, and past hypothetical questions about the story. This procedure was then repeated for the remaining two stories. Since the questions asked depended in part on the child's previous answers, no two children were asked an identical set of questions. Nonetheless, the technique was valuable in that it elicited a considerable amount of hypothetical reference attempts by the children.

The entire procedure was recorded on a portable tape recorder and later transcribed by the investigator who had been present during testing.

Scoring. The speech samples from Study 1 and the children's answers from Study 2 were analyzed for the following: (1) Implicit hypothetical reference -- defined as the omission of necessary forms such as would or if. (2) Explicit hypothetical reference -- defined as the use of some at least quasi-appropriate form in hypothetical reference attempts, although the form used need not be the most appropriate form (e.g., the use of will rather than would). (3) Reference to isolated hypothetical events. (4) Reference to sequences of related hypothetical events. (5) Reference to past hypothetical events. (6) Reference to future hypothetical events. (7) Self-initiated hypothetical reference -- defined as those reference attempts the child initiated. (8) Other-initiated hypothetical reference -- defined as those reference attempts the child produced in

response to another's question or comment. The latter two categories were used only in the scoring of the speech samples obtained in Study 1 since the hypothetical reference attempts by the children in Study 2 were almost always of the other-initiated variety.

Results

Implicit vs. explicit hypothetical reference

The results demonstrate that there is a developmental shift during the preschool years from implicit to explicit hypothetical reference, as shown in Tables 1, 2, and 3. It is difficult, of course, to demonstrate that the children engaging in implicit hypothetical reference were in fact engaging in hypothetical reference since the implicit hypothetical reference attempts by definition lack the forms which denote hypothetical reference. However, the implicit hypothetical reference attempts differ from "don't know" answers and irrelevant answers as well as from the explicit hypothetical reference attempts, as the following examples of implicit hypothetical reference demonstrate.

Adult	Child
What would happen if you fell out of an airplane?	
	I fall and fall and fall. (I.B.-3;2)
* * * * *	
What if I put this under Daddy's pillow?	
	It break and Daddy get angry. (D.N.-3;0)
* * * * *	

When children first begin to make explicit hypothetical reference, they tend to use inappropriate forms and only later learn to use newly acquired appropriate forms. The following are examples of children using inappropriate forms in their hypothetical reference attempts.

Adult	Child
What would happen if the girl didn't want her ears pierced?	
	Then she won't get pierced ears. Or she will cry. (V.Q.-3;7)
* * * * *	
Who would fix your breakfast if I slept as late as Daddy?	
	Nobody will. I'll just watch T.V. if you would sleep so late. (H.K.-3;6)
* * * * *	

Where would we put him?

We would put him outside with a leash and he won't run away.

What would you do with a horse?

I would ride it.

What else?

Not a cow.

Not a cow. What else would you do with a horse?

And I would say giddyup horse and he would go whee-ee.

Who would clean up the horse's mess?

You.

No.

Mommy and I would.

You would.

Mommy and I would.

Who would have to feed the horse?

I would get some hay. I will get some water and some hay and he will drink the water and he will eat the hay. And I will get some straw and he will eat the straw. (A.K.-3;7)

• • • • •

The following are examples of consistent hypothetical sequences:

What would happen if people were fish?

Then if a whale came, they would get eated. But if they hided, the whale maybe couldn't find 'em. And, and then they wouldn't get eated. (L.R.4;8).

• • • • •

What would have happened if the children would have been quiet?

Nothing.

Why?

Cause the mother would have sleeped.

What would have happened then?

Everybody would have sleeped. And the mother would have sleeped longer.

What would they have done after they all woke up?

I don't know. I guess eat breakfast. (L.Y., 6;4)

Reference to isolated vs. sequences of hypothetical events.

Initially, children tend to refer to isolated hypothetical events rather than to sequences of hypothetical events, as shown in Tables 4, 5, and 6. When children do begin to refer to sequences of related hypothetical events, their attempts lack internal consistency with respect to "hypotheticalness." It is only considerably later that children begin to produce internally consistent hypothetical sequences.

The following is an example of an inconsistent hypothetical sequence:

Adult	Child
We can't have a real horse here.	
	How come?

Past vs. future hypothetical reference

Reference to future hypothetical events appears to be an earlier acquisition than reference to past hypothetical events. Moreover, children appear to be much more likely to engage in reference to future hypothetical events than in reference to past hypothetical events, although this disparity diminishes with increasing age, as shown in Tables 2, 3, and 5. (The information provided in these tables concerning past and future hypothetical reference excludes utterances such as "what if you were a bird?" which are not clearly past or future reference.)

Children made two types of errors in their responses to past hypothetical questions. One error-type consisted of the omission of auxiliary *have* and the use of a past tense main verb form, indicating that the children were attempting past tense reference. The other error-type consisted of the child responding to a past hypothetical question with a future hypothetical form. This is another illustration of the developmental superiority of future hypothetical reference, particularly since no child ever responded to a future hypothetical question with a past hypothetical form. Examples of these two types of errors include:

Table 1

Percentage of Time Abe Engaged in Various Types of Hypothetical Reference at Six Month Intervals

Age	Implicit hypo. ref.	Explicit hypo.ref.	Past hypo ref.	Future hypo ref.	Self-init. hypo.ref.	Other-init. hypo.ref.
2;6	0	0	0	0	0	0
3;0	93.9	6.1	0	100	0	100
3;6	14.9	85.1	7.7	92.3	0	100
4;0	0	100	0	100	0	100
4;6	0	100	6.5	93.5	13.4	86.6
5;0	.7	99.3	31.6	68.4	7.4	92.6

Table 2

Percentage of Time the 14 Children in the Cross-sectional Sample in Study 1 Engaged in Various Types of Hypothetical Reference

S.	Age (in months	Implicit hypo.ref.	Explicit hypo.ref.	Past hypo.ref.	Future hypo.ref.	Self-init. hypo.ref.	Other-init. hypo.ref.
N.E.	29-30	0	0	0	0	0	0
M.Z.	30-31	0	0	0	0	0	0
I.B.	35-36	13.7	86.3	0	100	0	100
D.N.	37-38	47.4	52.6	0	100	0	100
H.K.	41-42	2.5	97.5	1.3	98.7	0	100
V.Q.	42-43	6.1	93.9	4.4	95.6	2.8	97.2
G.D.	47-48	0	100	17.8	82.2	7.0	93.0
K.M.	47-48	0	100	8.9	91.1	13.4	86.6
F.Y.	54-55	1.4	98.6	2.6	97.4	2.1	97.9
L.R.	55-56	3.3	96.7	11.3	88.7	4.6	95.4
A.B.	59-60	1.9	98.1	0	100	0	100
H.L.	60-61	0	100	6.1	93.9	0	100
J.W.	67-68	0	100	16.7	83.3	6.5	93.5
J.W.	68-69	0	100	18.8	81.2	4.3	95.7

Table 3

Percentage of Time Children in each Age Group in Study 2 Engaged in Implicit and Explicit Hypothetical Reference

Age Group (in years)	Implicit	Explicit
3	37.8	62.2
4	17.1	82.9
5	6.4	93.6
6	1.5	98.5
7	1.8	98.2

Table 4

Age at which Abe First Made Explicit Reference to Various Hypothetical Reference Categories

Hypo. ref. type	Other-initiated	Self-initiated
Future (isolated)	2;9	3;8
Past (isolated)	3;3	3;11
Future (sequence)*	3;0	3;8
Past (sequence)*	3;8	4;10

* sequences need not have been internally consistent

Table 5

Hypothetical Reference Types Engaged in by the 14 Children in the Cross-sectional Sample. (I=isolated, s=sequences)

	Other-initiated				Self-initiated			
S	Future(I)	Past(I)	Future(s)	Past(s)	Future(I)	Past(I)	Future(s)	Past(s)
N.E.	-	-	-	-	-	-	-	-
M.I.	-	-	-	-	-	-	-	-
I.B.	+	-	-	-	-	-	-	-
D.N.	+	-	-	-	-	-	-	-
H.K.	+	+	+	+	+	-	-	-
V.Q.	+	+	+	-	+	-	-	-
G.D.	+	+	+	+	+	+	+	-
K.M.	+	+	+	-	+	+	-	-
F.Y.	+	+	+	-	+	+	-	-
L.R.	+	+	+	-	-	-	-	-
A.B.	+	-	-	-	-	-	-	-
H.L.	+	+	+	+	+	-	+	+
J.W.	+	+	+	+	+	+	+	+
C.P.	+	+	+	+	+	+	+	+

Table 6

Number of Children in Study 2 Who Engaged in Various Types of Hypothetical Reference

Age group (in years)	Non-hypo. story (about lion)		Hypo. ref. stories			
	Future	Past	Future (I)	Past (I)	Future(s)	Past(s)
3	0	13	12	2	1	0
4	3	11	14	7	5	2
5	6	9	15	11	7	2
6	4	11	15	14	10	6
7	4	11	15	13	6	3

Adult	Child
What would you have done if it wouldn't have rained this morning?	
	I would play outside. (A.K., 3;8)
* * * * *	
Why would he have been scared of a canary?	
	Cause the canary would bited him. (H.K., 3;6)
* * * * *	

Self-initiated vs. other-initiated hypothetical reference

As shown in Tables 2 and 4, other-initiated hypothetical reference occurred much more often than self-initiated hypothetical reference in the spontaneous speech samples. This difference is not surprising, considering that the parents were instructed to ask their children hypothetical questions wherever the situation permitted. As shown in Tables 4 and 5, each of four hypothetical reference categories (reference to an isolated past hypothetical event, reference to an isolated future hypothetical event, reference to a sequence of related past hypothetical events, and reference to a sequence of related future hypothetical events) appeared in an other-initiated context earlier than in a self-initiated context, a finding perhaps also related to the amount of other-initiated hypothetical reference which permeated the speech samples. However, the most interesting difference between self-initiated and other-initiated hypothetical reference concerned accuracy. Children were consistently more accurate (i.e., used appropriate obligatory forms) when they initiated the reference to a hypothetical event than when they responded to a hypothetical query. This was true for both past and future hypothetical reference, as the following examples illustrate:

Other-initiated

What would happen if the cowboy forgot how to ride a horse?

I don't know. He'll probably get a car. (K.M., 4;0)

* * * * *

Self-initiated

If I go way way back where the construction guys are working, I would have to watch out for a tractor. (K.M., 4;0).

* * * * *

Other-initiated

What would have happened if they couldn't have found any water?

They gotted a hose.

Oh. What would have happened if the hose had broken?

Then they would have a short hose.

Do you think they would have had trouble putting the fire out with a short hose?

Yeah. They would have to say "Come here, fire. Come here fire."

Why would they say that?

Because the hose, because a broked hose wouldn't reach the fire.

Oh. Do you think the fire would listen?

No. Fires aren't alive, silly. (A.K., 3;11)

Self-initiated

If you would have eated all that turkey, your tummy would have kersploded. (A.K., 3;11)

* * * * *

Other-initiated

What would you do if you were a girl and not a boy?

I would cry. I won't play with dolls. I would be a girl forest ranger.

Why?

Cause

Why wouldn't you play with dolls?

Cause forest rangers would laugh. I'll just put out fires and stuff. (H.L., 5;1)

Self-initiated

What if you were the Easter Bunny?

I don't know - What?

Then I'd be the Green Giant. And I would step on you.

I wouldn't like that.

After I stepped on you, I'd take you to the doctor. He would fix you all up. (H.L. 5;1)

* * * * *

Discussion (and a few more results)

In the following discussion, we offer a speculative account for each of four developmental patterns: (1) the early use of inappropriate forms in children's hypothetical reference attempts, (2) the developmental superiority of future hypothetical reference, (3) children's initial tendency to refer to isolated hypothetical events but not sequences of related hypothetical references, and (4) children's higher degree of accuracy in self-initiated than in other-initiated hypothetical reference.

Use of inappropriate forms

Children's early use of inappropriate forms in hypothetical reference supports one of the two form/function hypotheses put forth by a number of theorists (Cassirer, 1955; Cromer, 1968, 1974; Slobin, 1973; Werner & Kaplan, 1963), namely that newly acquired functions (meanings) are first expressed by previously acquired forms (new meanings are first expressed by old forms). However, the support for this hypothesis is not unequivocal. Abe used would in his earliest hypothetical reference attempts, this being a case of a new form being used to refer to a new meaning. However, Abe also used old forms in his early (and later) attempts at hypothetical reference (cf. Kuczaj, 1977). Interestingly, some inappropriate old forms were excluded from hypothetical reference before others. For example, Abe last used gonna to make hypothetical reference at age 2;10, but inappropriately used will to make hypothetical reference until age 4;8, a difference likely due to will bearing a greater similarity than gonna to would. Although will, would, and gonna are semantically similar, will and would both appear in sentence-initial position in yes-no questions, while gonna does not (*gonna you go to the store?). Will and would also appear in the position immediately following the wh-word in wh-questions, but gonna does not (*why gonna you eat that?). Children rarely, if at all, inappropriately place gonna in a modal auxiliary position in interrogatives, which suggests that they do apprehend a difference between gonna and will/would.

Future vs. Past

Future hypothetical reference was an earlier and apparently easier acquisition than past hypothetical reference, since even after children began to produce past hypothetical reference they continued to make more future than past hypothetical reference. This finding is not due to the greater syntactic complexity of the past hypothetical form. Abe was competent with Modal auxiliary + have + past participle (M have Ved) declarative forms at age 3;4 (his first production of such a form was at age 2;9, we should have gotted some for you), more than a year before he consistently used these forms in past hypothetical reference. Moreover, five of the children in the cross-sectional sample in Study 1 who exhibited difficulty with past hypothetical reference were competent with M have Ved declarative forms (Kuczaj & Maratsos, in preparation). Thus, the late emergence of past hypotheticals is not due to syntactic factors alone, a finding consistent with those reported by Bates (1976), Cromer (1974), and Slobin (1973).

Temporal referencing skills per se also cannot account for the earlier acquisition of future hypothetical reference. The children in Study 1 engaged in more past reference than future reference except for hypothetical reference (Kuczaj, in preparation). Also, the children in Study 2 responded much more often with past tense stories than future tense stories when asked to tell a (non-hypothetical) story about a lion.

Since syntactic complexity and temporal referencing skills cannot account for the later emergence of past hypotheticals than future hypotheticals, this developmental sequence must be due to the greater difficulty of thinking about past hypotheticals than future hypotheticals. Although neither past nor future events are present at the time at which the speaker refers to them, past events did occur at some past time while future events have not yet occurred at any time. The child may find it more difficult to deal with past hypothetical events than future hypothetical events because the child experiences more difficulty in contrasting "what could have happened but did not" (hypothetical) with "what did happen" (actual) than in contrasting "what could happen" (hypothetical) with "what will happen" (prediction). In past hypotheticals, one contrasts unactual and actual events, while in future hypotheticals, one contrasts two different types (hypothetical vs. predicted occurrence) of unactual events, and it may be that the child finds the latter contrast easier than the former.

Late emergence of reference to hypothetical sequences

It is likely that the late emergence of reference to related hypothetical events as compared to reference to isolated hypothetical events (and the finding that children's early attempts to refer to hypothetical sequences are internally inconsistent) reflects the difficulty children have in relating propositions, which in turn may reflect the young child's inability to decenter his thought (Bates, 1976; Cromer, 1968, 1971), a notion which gains support from the finding that the more events involved in a particular hypothetical sequence, the more likely the child would be inconsistent. However, the child's inability to decenter his thinking cannot completely account for this finding since many of the children in Study 1 who exhibited difficulty in being consistent in their reference attempts concerning sequences of hypothetical events did not exhibit a lack of consistency when referring to sequences of actual past events or expected future events (Kuczaj, in preparation). At any rate, the results demonstrate that pre-school children are capable of at least some degree of interpropositional thinking, which is consistent with the findings of Donaldson (1963), Hill (1961), and Meyer (1977). Apparently, the difficulty lies in marking and maintaining hypothetical reference throughout a sequence of related

hypothetical events, not just with relating events per se. Also, consistent future hypothetical sequences were an earlier acquisition than consistent past hypothetical sequences, demonstrating once again the greater difficulty of past than future hypotheticals. (It should be noted that adults are not always consistent in their reference to sequences of related hypothetical events. For instance, the adult in the example concerning the fire hose on p. changes from past hypothetical reference to future hypothetical reference, this being an error frequently observed in the children's reference attempts.)

Self-initiated vs. other-initiated hypothetical reference

Children's better accuracy in self-initiated than other-initiated hypothetical reference reflects the differences involved in establishing the deixis and presuppositions of an utterance and comprehending the deixis and presuppositions of another's utterance. In self-initiated hypothetical reference, the speaker (in this case, the child) establishes the hypothetical framework (deixis and presuppositions), while in other-initiated hypothetical reference the listener must pick up the hypothetical framework. The data suggest that children have more difficulty in picking up the hypothetical framework than they do in establishing the hypothetical framework, particularly insofar as past hypotheticals are concerned. If so, it is likely that comprehension tasks underestimate a child's knowledge of hypotheticals, particularly his productive control of hypothetical forms.

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